Supplemental Material

Supplemental Methods: Ascertainment of outcome events

Figure S1: Kaplan-Meier curves for overall survival by eGFR category and Lifestyle Behavior Scores

Figure S2: Cumulative incidence functions for major coronary disease events across eGFR categories and Lifestyle Behavior Scores

Figure S3: Cumulative incidence functions for ischemic stroke events across eGFR categories and Lifestyle Behavior Scores

Figure S4: Cumulative incidence functions for heart failure events across eGFR categories and Lifestyle Behavior Scores

Table S1. Association of continuous measures of diet, body mass index, sodium intake, and potassium intake with All-Cause Death, Major Coronary Events, Ischemic Stroke, and Heart Failure by eGFR category

Table S2: Assessment of statistical interactions between lifestyle behaviors and clinical outcomes by continuous eGFR (centered)

Table S3: Associations of Lifestyle Behavior Scores and All-Cause Death, Major Coronary Events, Ischemic Stroke, and Heart Failure Events by eGFR category among participants without a history of cardiovascular disease at baseline.

Supplemental Methods

Ascertainment of Outcome Events			
	ARIC	**CHS**	**MESA**
	Potential incident events were identified by: (1) participants were contacted annually by phone and interviewed about interim hospitalizations for cardiovascular events, procedures, and deaths; Possible hospital events were abstracted for information related to symptoms, signs, times of onset and admission, enzymes, electrocardiogram, and treatment. (2) local hospitals provided lists of hospital discharges with cardiovascular diagnoses, and these were reviewed to identify cohort hospitalizations; (3) health department death certificate files were continuously surveyed. All discharge codes for cohort hospitalizations and listed causes of death from death certificates were recorded.	Participants or their proxies were contacted twice a year to identify potential cardiovascular-related events and to confirm vital status. Hospitalizations and deaths were also detected by active surveillance through field center investigations. Records were abstracted by trained personnel. Classification was performed by study committees for each end point using modified standardized criteria.[1]	In addition to follow up examinations every 2 years, participants were followed up every 9 to 12 months by telephone to obtain information on interim hospital admissions, cardiovascular outpatient diagnoses, and deaths. Self-reported diagnoses were verified from death certificates, medical records for all hospitalizations, and outpatient diagnoses. Hospital records were abstracted by trained personnel and transmitted to the coordinating center. Two physicians (cardiologists or cardiovascular physician epidemiologists) reviewed the records for independent end point classification and disagreements were adjudicated by both. If disagreements were not resolved the full morbidity and mortality classification committee made the final decision.
Definition of Outcomes			
Composite of major coronary events	incident MI, fatal coronary heart disease, or cardiac procedure	incident MI, fatal CHD, or angioplasty	incident MI, fatal coronary heart disease, or angioplasty
1) Myocardial infarction	A diagnostic algorithm was used to classify each individual as “definite MI,” “possible MI,” or “no MI” using standardized criteria. Reviewers classified MI based primarily on combinations of symptoms, ECG, and cardiac biomarker levels.	CHS adopted the ARIC criteria for MI	Reviewers classified MI based primarily on combinations of symptoms, ECG, and cardiac biomarker levels. In most cases, definite or probable MI required either abnormal cardiac biomarkers (2 times upper limits of normal) regardless of pain or ECG findings; evolving Q waves regardless of pain or biomarker findings; or a combination of chest pain, and ST-T evolution or new LBBB, and biomarker levels 1-2 times upper limits of normal.
a) Definite	Must have ONE of the following: - Evolving diagnostic ECG pattern - Diagnostic ECG pattern and abnormal enzymes (≥ 2 times normal) - Cardiac pain and abnormal enzymes and either an evolving ST-T pattern or an equivocal ECG pattern	Must have ONE of the following: - Evolving diagnostic ECG pattern - Diagnostic ECG pattern and abnormal enzymes - Cardiac pain and abnormal enzymes and either an evolving ST-T pattern or an equivocal ECG pattern	
b) Probable	- Cardiac pain present, equivocal cardiac enzymes (between upper limits of normal and x2 upper limits of normal) with non-evolving major EKG changes - Cardiac pain absent, evolving EKG changes with equivocal enzymes	- Cardiac pain present, equivocal cardiac enzymes (between upper limits of normal and x2 upper limits of normal) with non-evolving major EKG changes - Cardiac pain absent, evolving EKG changes with equivocal enzymes	

2) Fatal Coronary Heart Disease	Definite fatal coronary heart disease required a documented MI within the previous 28 days (with no known non-atherosclerotic or non-cardiac atherosclerotic process or event that was lethal) as well as deaths for which there was evidence of chest pain within 72 hours before death or history of chronic ischemic heart disease such as coronary insufficiency or angina pectoris and no known non-atherosclerotic cause Possible fatal CHD was defined as those without sufficient evidence to be diagnosed as definite, no known non-atherosclerotic or non-cardiac atherosclerotic process, and an underlying cause of death of 410-414, 427.4, 429.2, 799	Definite fatal coronary heart disease determined by: definite MI within 4 weeks of death and no known non-atherosclerotic cause; or no known non-atherosclerotic cause, and one or both of the following: chest pain within 72 hours of death, or a history of chronic ischemic heart disease in the absence of history of chronic ischemic heart disease in the absence of valvular heart disease or non-ischemic cardiomyopathy Possible Fatal coronary heart disease determined if there was no known non-atherosclerotic cause, and death certificate consistent with underlying cause	Definite fatal coronary heart disease required a documented MI within the previous 28 days, chest pain within the 72 hours before death, or a history of CHD, and required the absence of a known non-atherosclerotic or non-cardiac cause of death. Possible Fatal coronary heart disease – assigned if an underlying cause of death consistent with fatal coronary heart disease and required the absence of a known non-atherosclerotic or non-cardiac cause of death
3) Cardiac procedure / coronary revascularization	Cardiac procedure during hospitalization such as cardiac catheterizations and angioplasty	Angioplasty	Angioplasty, coronary stent or coronary atherectomy, coronary revascularization
Heart Failure	incident heart failure was defined as the first occurrence of either (1) a hospitalization which included an International Classification of Diseases, 9th revision, discharge code of 428 (428.0 to 428.9) in any position, or (2) a death certificate with a 428 (HF) or International Classification of Diseases, 10th revision, code I50 (HF) in any position occurring from baseline (1987–1989) through December 31, 2004, among persons without a previous record at baseline of a hospitalization with an *International Classification of Diseases, Ninth Revision, Clinical Modification* code 428. Since 2005, HF determined by physician adjudication of HF hospitalizations or HF death according to CID codes (code 410 in any position). Each hospitalization was classified into one: acute decompensation HF (ADHF), chronic stable HF, HF unlikely, or unclassifiable. Definite ADHF required clear evidence either from symptoms, signs, imaging or treatment of an acute exacerbation, worsening or new onset of symptoms or other decompensated circulatory state. Evidence of a decompensated state included augmentation of therapy for worsening HF signs or symptoms, documentation of subsequent in-hospital control of symptoms by therapy, documentation of the specificity of HF for decompensated state as opposed to other co-morbidities (e.g. chronic obstructive	Criteria for Heart Failure relied on physician diagnosis, treatment, and diagnostic test results. Required that the participant must have BOTH of the following: - The diagnosis of congestive heart failure from a physician and be under medical treatment for congestive heart failure. - Medical treatment is defined as a current prescription for BOTH of the following: -a diuretic, and - digitalis or a vasodilator (e.g. Nitroglycerin, apresoline, or angiotensin converting enzyme (ACE) inhibitor) In addition, any of the following criteria were sufficient but not necessary to validate a congestive heart failure diagnosis: - The presence of cardiomegaly and pulmonary edema on chest X-ray, or evidence of a dilated ventricle and global or segmental wall-motion abnormalities with decreased systolic function either by echocardiography or contrast ventriculography.	Heart Failure was defined as a diagnosis made by a physician and medical treatment for heart failure, and 1 or more additional objective criteria were required, such as pulmonary edema/congestion by chest X-ray, dilated ventricle or poor left ventricular function by echocardiography or ventriculography, or evidence of left ventricular diastolic dysfunction. Definite or probable HF required heart failure symptoms, such as shortness of breath or edema. In addition to symptoms, probable HF required HF diagnosed by a physician and patient receiving medical treatment for HF. Definite HF required one or more other criteria, such as pulmonary edema/congestion by chest X-ray; dilated ventricle or poor LV function by echocardiography or ventriculography; or evidence of left ventricular diastolic dysfunction.

	pulmonary disease (COPD), end-stage renal disease). For a classification of definite ADHF, evidence that the HF treatment (e.g. diuresis) was the main treatment that resulted in improvement is required. A case was considered possible ADHF if the presence of co-morbidity could also account for the acute symptoms or if there was not enough information to classify as definite ADHF. Chronic stable HF required evidence of compensated HF signs and symptoms controlled by therapy with no evidence of therapy augmentation or symptom worsening during the hospitalization. Evidence of left ventricular systolic dysfunction (ejection fraction < 50%) with no HF symptoms was sufficient for classification as chronic stable HF. Asymptomatic diastolic dysfunction was not sufficient for a classification as chronic stable HF. Hospitalizations were classified as no HF if the available documentation in the medical record indicated directly or indirectly that heart function was normal. A designation of unclassifiable was usually used in cases were medical records were insufficient to differentiate between a classification of chronic stable HF and no HF or in the infrequent case of missing medical records. For the purposes of these analyses, cases classified as HF unlikely or determined to be unclassifiable were combined as no HF.		

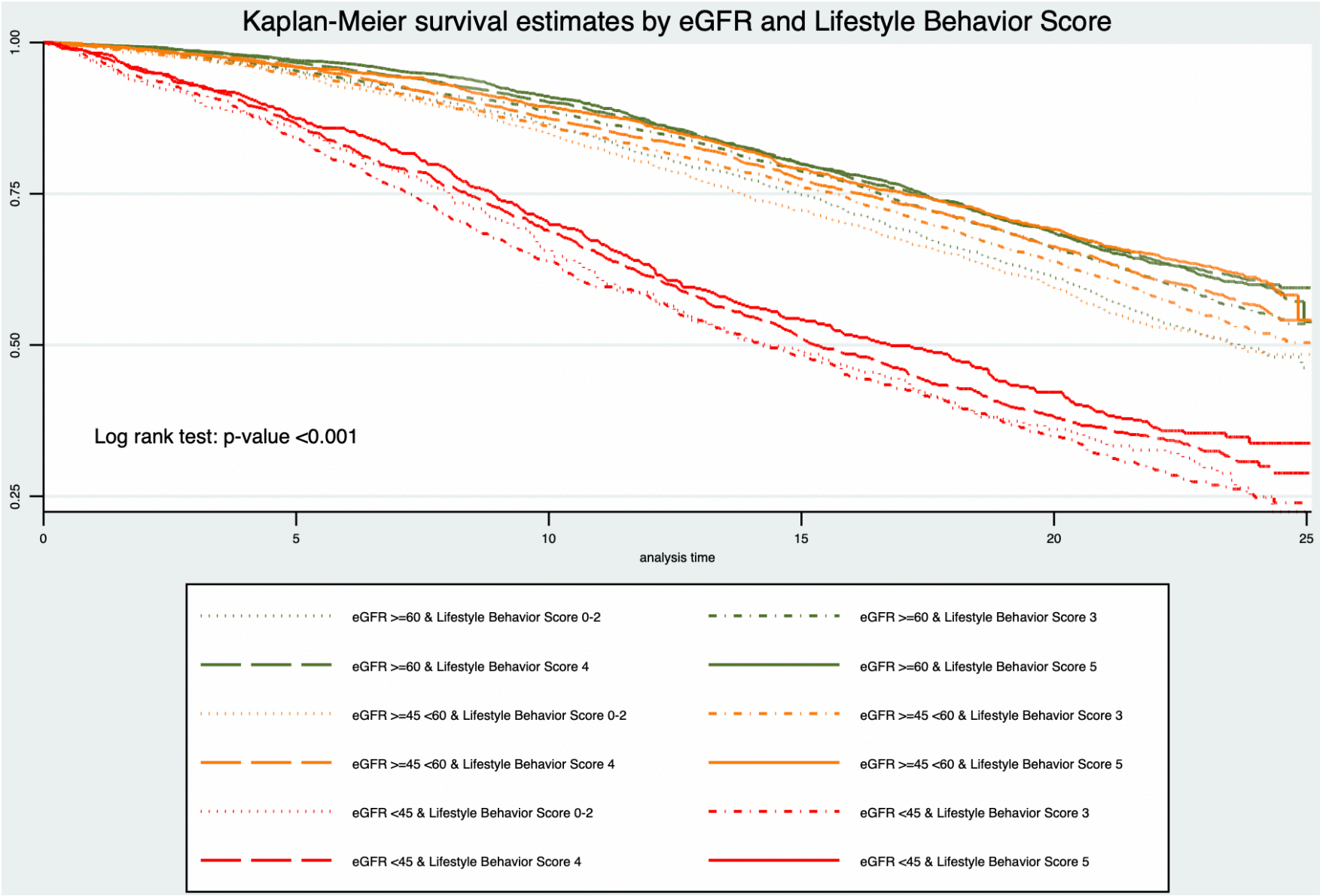

Figure S1: Kaplan-Meier curve for overall survival by eGFR category and Lifestyle Behavior Scores

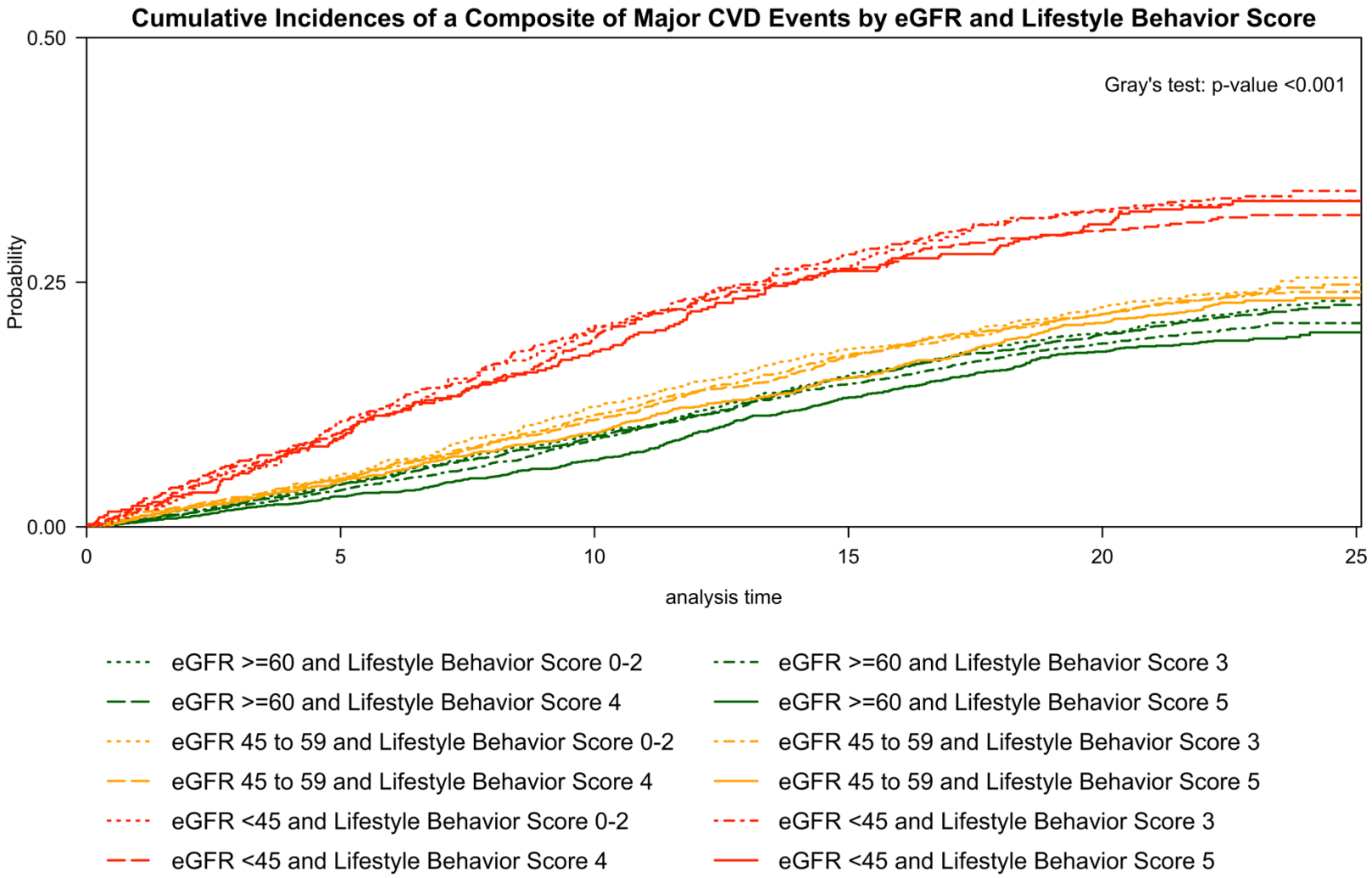

Figure S2: Cumulative incidence functions for major coronary events across eGFR categories and Lifestyle Behavior Scores

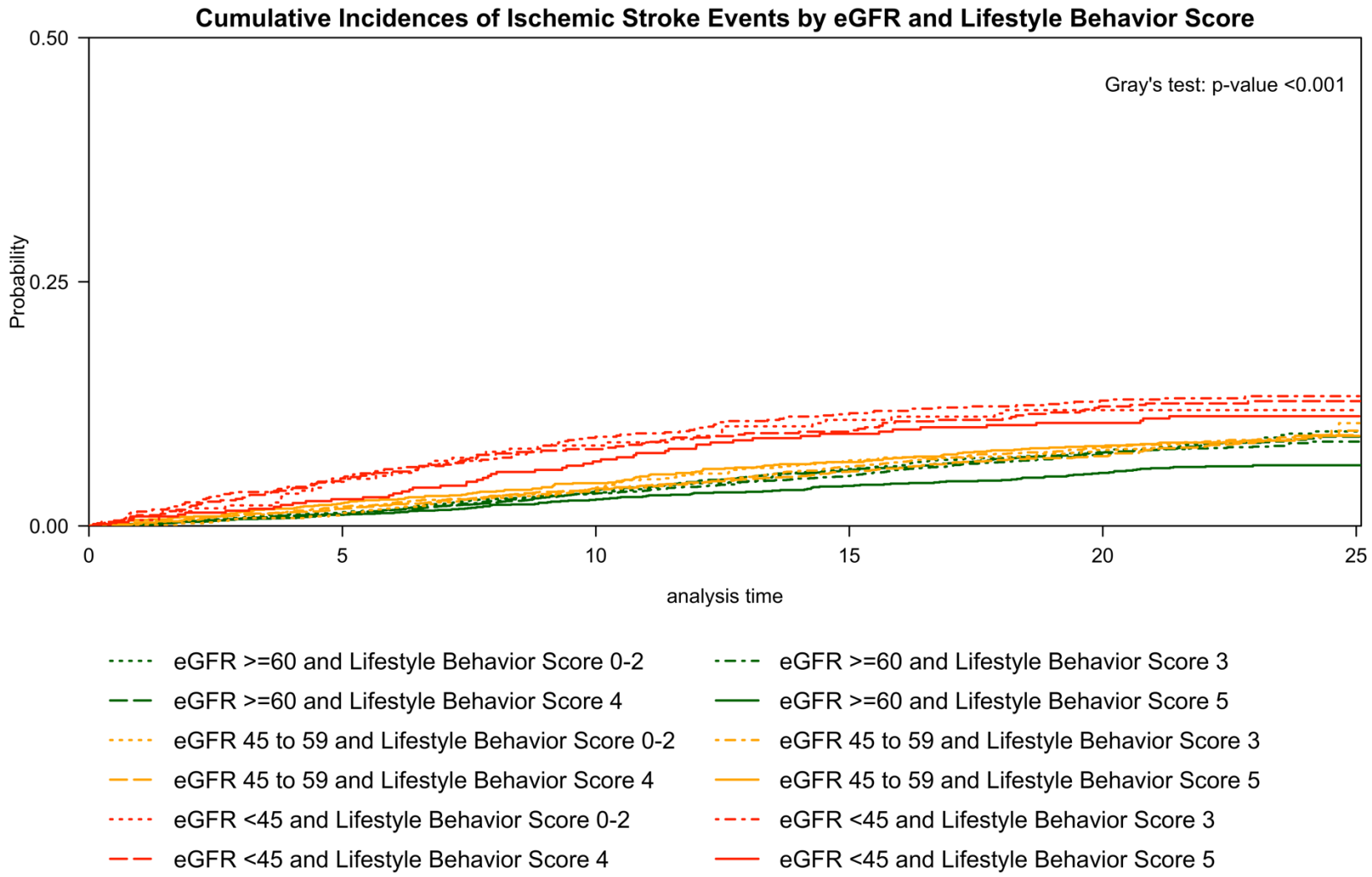

Figure S3: Cumulative incidence functions for ischemic stroke events across eGFR categories and Lifestyle Behavior Scores

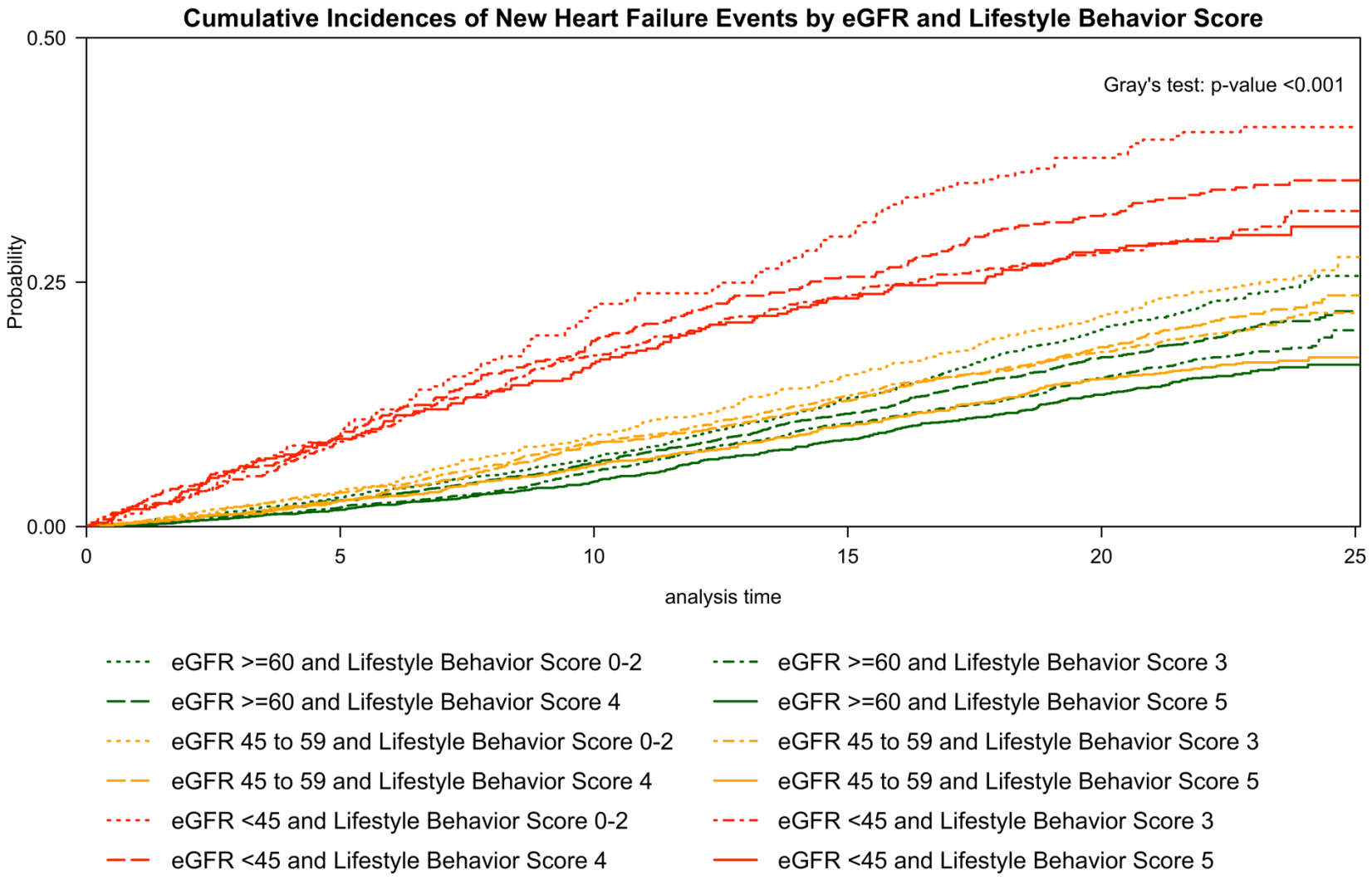

Figure S4: Cumulative incidence functions for heart failure events across eGFR categories and Lifestyle Behavior Scores

Table S1. Association of continuous measures of diet, body mass index, sodium and potassium intake with all-cause death, major coronary events, ischemic stroke, and heart failure

	All eGFR Groups		p-value-interaction
	HR (95% CI)	p-value	
All-Cause Death			
Sodium intake (per SD)	1.03 (1.01-1.06)	0.006	0.45
Potassium intake (per SD)	1.02 (0.99-1.05)	0.13	0.19
Diet score (per 1 unit)	0.94 (0.92-0.96)	<0.001	0.94
BMI (per kg/m^2)	1.00 (0.99-1.01)	0.80	0.14
Major Coronary Events^			
Sodium intake (per SD)	0.99 (0.95-1.02)	0.42	0.85
Potassium intake (per SD)	0.99 (0.96-1.02)	0.59	0.19
Diet score (per 1 unit)	0.97 (0.94-1.00)	0.045	0.57
BMI (per kg/m^2)	1.02 (1.01-1.02)	<0.001	0.82
Ischemic Stroke			
Sodium intake (per SD)	0.95 (0.90-1.00)	0.06	0.52
Potassium intake (per SD)	0.94 (0.89-1.00)	0.04	0.18
Diet score (per 1 unit)	0.95 (0.91-1.00)	0.07	0.82
BMI (per kg/m^2)	1.00 (0.99-1.01)	0.69	0.33
Heart Failure			
Sodium intake (per SD)	1.03 (0.99-1.06)	0.17	0.13
Potassium intake (per SD)	1.05 (1.01-1.08)	0.017	0.70
Diet score (per 1 unit)	0.97 (0.94-1.01)	0.12	0.29
BMI (per kg/m^2)	1.04 (1.04-1.05)	<0.001	0.54

eGFR – estimated glomerular filtration rate; BMI – body mass index
Models adjusted for age, race, sex, education, baseline eGFR, hypertension, BMI, systolic blood pressure, diastolic blood pressure, history of diabetes, history of cardiovascular disease, ace-inhibitor use, beta-blocker use, aspirin use, statin use, total cholesterol, eGFR category, and original cohort as a random effect.
^adjustment did not include history of cardiovascular disease due to numerical infeasibility

The magnitude of the associations of non-smoking, compared to current smoking, with all-death and major coronary events, -0.818 and -0.516, respectively, were larger among individuals with higher baseline eGFR values, where the negative associations increase 0.005 per 1 mL/min/1.73m^2 increase in eGFR for both models (see Table S2 below).

The magnitude of the associations of none/moderate alcohol intake, compared to excessive, with all-cause death and heart failure events, -0.157 and -0.017, respectively, were larger among individuals with higher baseline eGFR values, where the negative associations increase 0.008 per 1 mL/min/1.73m^2 increase in eGFR for both models (see Table S2 below).

Table S2: Assessment of statistical interactions between lifestyle behaviors and clinical outcomes by continuous eGFR (centered)

	Beta coefficient of behavior*eGFR (95% CI)	**p-value**
All-Cause Death		
Smoking (no vs current)	-0.005 (-0.008, -0.003)	<0.001
BMI (18.5 to <30 vs ≥30)	0.003 (-0.0001, 0.005)	0.06
Diet score (≥2 vs 0-1)	0.0004 (-0.002, 0.003)	0.75
Physical Activity (>1 vs 0 minute/week)	0.0001 (-0.002, 0.002)	0.95
Alcohol intake (none/moderate vs excessive)	-0.008 (-0.011, -0.004)	<0.001
Major Coronary Events^		
Smoking (no vs current)	-0.005 (-0.009, -0.001)	0.02
BMI (18.5 to <30 vs ≥30)	0.001 (-0.02, 0.005)	0.50
Diet score (≥2 vs 0-1)	-0.0008 (-0.004, 0.003)	0.66
Physical Activity (>1 vs 0 minute/week)[1]	0.002 (-0.001, 0.006)	0.17
Alcohol intake (none/moderate vs excessive)	-0.004 (-0.01, 0.003)	0.24
Ischemic Stroke		
Smoking (no vs current)	-0.005 (-0.01, 0.001)	0.08
BMI (18.5 to <30 vs ≥30)	-0.003 (-0.009, 0.002)	0.27
Diet score (≥2 vs 0-1)	-0.002 (-0.007, 0.003)	0.50
Physical Activity (>1 vs 0 minute/week)	-0.004 (-0.009, 0.001)	0.13
Alcohol intake (none/moderate vs excessive)	0.003 (-0.006 0.012)	0.53
Heart Failure		
Smoking (no vs current)	-0.0004 (-0.005, 0.004)	0.87
BMI (18.5 to <30 vs ≥30)	-0.0008 (-0.005, 0.003)	0.69
Diet score (≥2 vs 0-1)	0.0009 (-0.003, 0.005)	0.65
Physical Activity (>1 vs 0 minute/week)	-0.0005 (-0.004, 0.003)	0.79
Alcohol intake (none/moderate vs excessive)	-0.008 (-0.01, -0.002)	0.01

eGFR – estimated glomerular filtration rate
Models adjusted for age, race, sex, education, baseline eGFR, hypertension, BMI, systolic blood pressure, diastolic blood pressure, history of diabetes, history of cardiovascular disease, aspirin use, ace-inhibitor use, beta-blocker use, statin use, total cholesterol, interaction of centered eGFR at mean*behavior, and original cohort as a random effect.
^adjustment did not include history of cardiovascular disease due to numerical infeasibility
[1] adjustment did not include history of hypertension due to numerical infeasibility

Table S3. Association of Lifestyle Behavior Score with All-Cause Death, Major Coronary Events, Ischemic Stroke, and Heart Failure among those without cardiovascular disease at baseline.

Lifestyle Behavior Score	All eGFR Groups	
	HR (95% CI)	p-value
All-Cause Death		
0-2	REF	
3	0.71 (0.66-0.76)	<0.0001
4	0.54 (0.50-0.58)	<0.0001
5	0.47 (0.43-0.52)	<0.0001
Major Coronary Events^		
0-2	REF	
3	0.85 (0.76-0.94)	0.001
4	0.75 (0.68-0.83)	<0.0001
5	0.69 (0.61-0.78)	<0.0001
Ischemic Stroke		
0-2	REF	
3	0.81 (0.68-0.95)	0.01
4	0.75 (0.63-0.88)	0.001
5	0.64 (0.53-0.78)	<0.0001
Heart Failure		
0-2	REF	
3	0.69 (0.62-0.76)	<0.0001
4	0.62 (0.56-0.69)	<0.0001
5	0.51 (0.45-0.59)	<0.0001

eGFR – estimated glomerular filtration rate; BMI – body mass index
Models adjusted for age, race, sex, education, baseline eGFR, hypertension, BMI, systolic blood pressure, diastolic blood pressure, history of diabetes, history of cardiovascular disease, aspirin use, ace-inhibitor use, beta-blocker use, statin use, total cholesterol, eGFR category, and original cohort as a random effect.
^adjustment did not include history of cardiovascular disease due to numerical infeasibility